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An Introduction To Implementing Technology In The Classroom Using Interactive Web-Based Applications

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An Introduction To Implementing Technology In The Classroom
Using Interactive Web-Based Applications
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Abstract

Today's students have grown up in a world where technology is an essential and accessible component of daily life, and it therefore plays an integral role in the modern classroom. Implementing technology into the traditional classroom can be an intimidating task; this curriculum project aims to aid educators in understanding the benefits of using technology, and to simplify its implementation. Desmos and Nearpod are used in this curriculum because they are excellent examples of two user-friendly and adaptable applets that facilitate technology-focused instruction. Each of the two units in this curriculum are designed to assist teachers who use a limited amount of technology in understanding both how these applets function, and how they can be adapted for any content. Each lesson is student-paced, includes authentic problems, and has a variety of activities for the students to interact with their peers or with the applets themselves. Technology-focused instruction provides ineffable opportunities in the classroom, and the goal of this curriculum is to help teachers become more comfortable with technology in order to take advantage of those opportunities..

Introduction

As more technology is integrated into the classroom, different amounts and types of technology work for different teachers. Not all teachers choose to use technology, but some states require the use of technology on standardized exams. For example, the Regents Exam in New York State (NYS) requires that students use graphing calculators on the Algebra Regents Exam. Implementing technology in the classroom to enhance learning can be challenging for teachers and there are often few, if any, concrete guidelines. The purpose of this thesis is to create a unit of lessons, or a mini curriculum, that teachers can use to support the integration of technology in the secondary mathematics classroom. This curriculum is designed to be adaptable and to assist teachers in the implementation of technology with the goal of student engagement and learning. Specifically, it incorporates two different applets: Nearpod and Desmos. The goal of implementing these applets in the classroom is to increase student engagement, which may correlate with increased student achievement.

Throughout this curriculum project, there will be many references to technological pedagogical content knowledge (TPCK) which is defined by a framework for teacher knowledge in technology integration (Mishra & Koehler, 2006). This framework consists of three different domains: pedagogical knowledge, content knowledge, and technological knowledge. Mishra & Koehler describe TPCK as an intersection of these three domains. “The TPCK framework suggests that content, pedagogy, and technology have roles to play individually and together. Teaching successfully with technology requires continually creating, maintaining, and re-establishing a dynamic equilibrium between each component.” (Mishra & Koehler 2007, pg. 8) There are many studies done on just TPCK alone because it is such a complex concept. In order to implement a TPCK model, one must understand why each individual part must work together.

“Teaching technology skills alone (the T in our model) does little to help teachers develop knowledge about how to use digital tools to teach more effectively (TP), navigate the relationships between technology and content representations (CT), or how to use technology to help students learn a particular topic (TPC). Likewise, isolation learning about curriculum content (C), or general pedagogical skills (P), will not necessarily help teachers develop an understanding of how to put this knowledge to use.” (Mishra & Koehler, 2007, pg. 9)

The purpose of this curriculum project is to give educators that do not normally use technology in their classroom a reason to start integrating more technology into their teaching. This thesis will provide evidence as to why technology should be implemented into the classroom, as well as provide a technology-focused curriculum that is easily adaptable into any mathematics classroom.

Literature Review

With the Common Core Learning Standards (CCLS) in NYS, teachers have new guidelines involving instruction and assessment. “Education must shift to incorporate computer-based, electronic technologies integrating learning with these technologies within the context of the academic subject areas” (Niess, 2005, pg. 1). Technology is a tool in which teachers can represent their material in a different manner than the traditional way. This thesis will answer the question, “Can I implement technology into my classroom if I’m not technologically savvy?” This curriculum project details a technology-focused curriculum facilitated by two different web-based, interactive technology applets—Nearpod and Desmos—that are easily adaptable to any classroom.

Teachers have their own style of instruction. Some teachers are very traditional, others utilize a limited amount of technology in their teaching, and some have implemented the flipped

classroom. However, with a growing presence of technology in the lives of students it is puzzling to observe that only 20% of current public school teachers feel comfortable using technology in their teaching (Rosenthal, 1999, Niess pg. 1). Moersch classifies an educator's amount of technology implementation on a five level scale. A teacher who uses a minimal amount of technology in their classroom is referred to as a Level 0 educator and for those who use technology in the classroom very heavily as Level 5 educator (Moersch, 1998). It is important to note that these levels do not indicate an educator's effectiveness or performance in the classroom, but rather refer to how heavily they integrate technology.

With new forms of technology constantly being produced, there is a plethora of information and resources available for teachers to improve their teaching practices and materials. One of those ways is by eLearning or digital learning. Doris Holzberger et al. (2013) regarded digital learning as delivery with digital forms of media (e.g. texts or pictures) through the Internet; and, the provided learning contents and teaching methods were to enhance learners' learning and aimed to improve teaching effectiveness or promote personal knowledge and skills. (Keane, 2012) broke digital learning down into four parts; digital teaching materials, digital tools, digital delivery, and autonomous learning. Digital teaching materials are defined as etextbooks, digital data, or any other content presented in a digital format. Digital tools are the items such as computers, tablets, or smart phones that digital teaching materials can be accessed from. Digital delivery is the internet or some other way that would be a passage for access to the digital teaching materials. Lastly, autonomous learning is where students are expected to use these tools and teaching materials on their own so that the technology will allow them to move at their own pace and at a level that is appropriate for them. Lin (2017) continues to discuss how digital learning can influence learning motivation. Lin (2017) describes digital learning as

“guiding students’ continued learning and efforts on the learning goal set by teachers in the learning process.” (pg. 4) Koff & Mullis (2011) defined it more clearly by defining learning motivation as “student intention or desire to participate in and make efforts on learning, which was performed on student choice of specific learning activity and the efforts on such activity” (p. 4). Lin (2017) measures learning motivation from observing intrinsic and extrinsic motivation. A study by Lin (2017) found that digital learning has a statistically significant positive effect on both intrinsic and extrinsic motivation when compared to traditional teaching. The same study also found that digital learning has a statistically significant positive effect on a student’s learning satisfaction when compared to traditional learning.

“Students not identified with academics should have little motivation to succeed in academics because there is no contingency between academic outcomes and self-esteem; good performance is not rewarding and poor performance is not punishing” (Osborne, Jones, P. 6.) Eccles explains why technology can promote motivation; “We predict that tasks will be seen as important when individuals view engaging in the task as central to their own sense of themselves (i.e., their core social and personal identities), because such tasks provide the opportunity for the individual to express or confirm important aspects of the self” (Eccles 2005, p. 109). Many times in a mathematics classroom a student will ask, “Why do I need to know this?” or “When am I ever going to use this in real life?”; these questions are indicators that a student is unmotivated and uninterested in the material they are learning. Renninger (2006) proposed a four-phase model of interest development that includes the following phases: (1) triggered situational interest, (2) maintained situational interest, (3) emerging individual interest, and (4) well-developed individual interest. Phases 3 and 4 are characterized by positive feelings, stored knowledge, and stored value. That is, in these stages, an individual values and identifies with the

content, as well as poses curiosity questions, becomes more self-regulated, and accumulates more information (Renninger 2009). Identification with the subject of mathematics has been connected with both positive academic outcomes and non-academic outcomes, such as total absences for the school year and number of behavior referrals issued. (Osborne unpublished paper; Osborne and Rausch 2001). Marsh et al. (2005) also explicitly tested and found support for the idea that a student's identification with mathematics can support math future-interest as well as outcomes in a mathematics classroom. Many aspects of a student's experience can affect their identification with academics; two of these aspects are whether a student is interested in a subject and whether they believe they belong in that subject. (Osborne, Jones) Since the lives of 21st century students are flooded with technology, technology-focused instruction should make them more comfortable with the content and therefore improve their academic performance.

According to Osborne and Jones, there are specific strategies that can aid students in identifying with academics and consequently increasing motivation. The first strategy is to empower the students in academics. Instructors who empower students by providing them with opportunities to have some control over their learning are referred to as "autonomy supportive" (Reeve and Jang 2006). Applications such as Desmos allow students to take their learning into their own hands, and in some cases learn an entire lesson without any direct instruction. This allows students to explore and gain control of their mathematical learning.

Desmos Curriculum: A Unit on Proportions

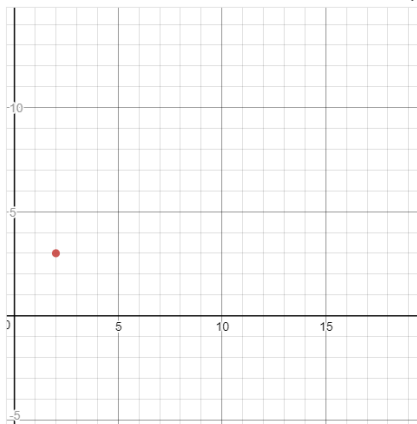
Desmos.com is a website that allows teachers to create an interactive, student-paced slideshow. Teachers can have students draw on graphs, have discussions from open-ended questions, and discover the mathematics they are learning at a speed they control. While students are working, the teacher can see every student's screen as well as their progress through the

desmos control panel in real time. Additionally, teachers can anonymize the students' names if the teacher wishes to show a student's work on the board for a discussion, and the teacher can also control students' pace if there are slides that the teacher wants to do as a class. One of the many benefits of creating a Desmos lesson is that they are fully customizable; for example, a teacher can add an image to any slide in order to inject fun and personality into the lesson, or to work on an assigned notes packet or homework. While a teacher can completely create and customize a lesson, Desmos has many pre-made lessons that are very engaging and cover a variety of content—teachers can simply search for material once logged onto [teacherdesmos.com](https://www.teacherdesmos.com).

This unit has four lessons, each designed to be approximately 40 minutes long for a class that meets daily. The unit will review the basic representation of proportions and how students can solve them. The author of this thesis made these lessons in such a way that any teacher trying to use one of the lessons can customize the text or questioning to meet the needs of their students. These lessons are all designed to be student-centered and student-paced. There may be cases where the teacher needs to take control and pace the lesson, but if students are working at their own pace, the teacher should be monitoring the students' progress from their console and searching for places to help individual students or address a common mistake students are making on a certain slide. It is important to note that these lessons are the exact same lessons that the author uses in their classroom, so there will be some pieces that include the author's name or include assignments that will only relate to the author's students. For example, there are pictures on the last slide of every lesson that do not relate to the content of the unit. These pictures are purely for the students' enjoyment and were included because of the author's relationship with their students.

Lesson 1:

The first slide shown to the right is an introduction slide. Here, students can see the objective of the lesson and are given a question that they will eventually solve by the end of the lesson. The teacher may discuss what it means to make something proportional and have the students discuss and infer what point B could be.

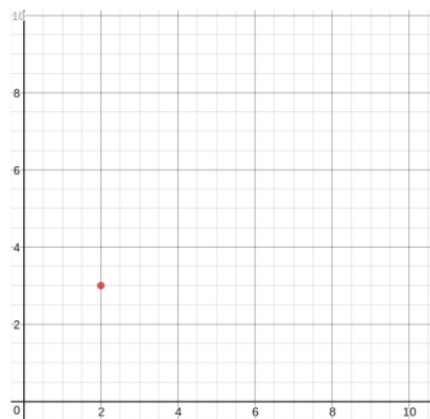
Slide 1.1**Proportions**

Hey class, today we are going to be talking about proportions to start reviewing for your test next week. Here's our first problem:

Line segment AB represents a proportional relationship. The graph shows Point A in red at (2,3). What is one ordered pair that could represent point B?

Let's not jump to the answer yet. Move onto the next slide to continue.

The second slide is to have students recall what it means for a line to be proportional. Students will complete the sentence and write their answer in the answer box shown to the right. Once the students click “Submit to Class” their answer will be shown next to their peers’ answers so they can confirm either that their answer is correct, or see that their answer is incorrect based on the rest of the class’s responses.

Slide 1.2

What does a proportional relationship mean on the graph? These two points need to connect to make a _____ and must go through the point (____, ____).

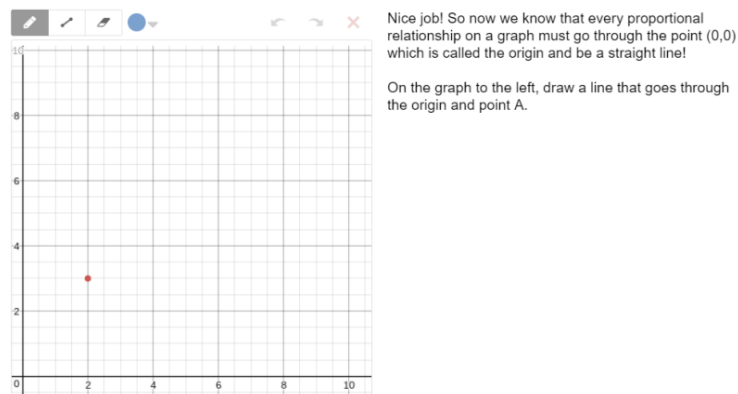
In the input box below, please fill in the blanks.

Once you answer, see if your answer matched with everyone else!

Submit to Class

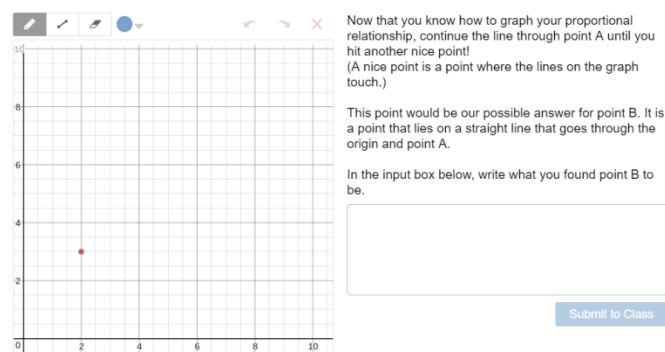
On the third slide, students are given the graph that they saw on slide 1.1, however they can use the tools located above the graph to draw and experiment with creating a proportional line that starts at the origin and goes through point A. The teacher can remind students what the original question was on Slide 1.1 so that students can begin to make more accurate inferences as to where point B could be.

Slide 1.3



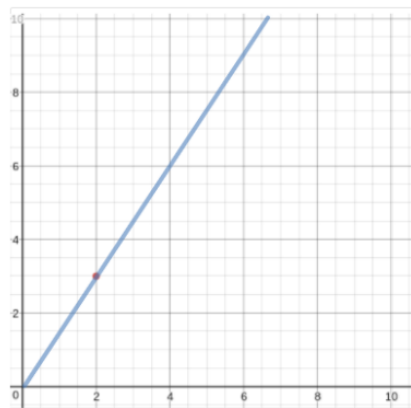
On Slide 1.4 students are meant to create their proportional line that they created on Slide 3 but extend that line so that it will also include what is defined here as a “nice point”. Once students have extended their line, they will be able to see what coordinate pair point B could be. They will put their answer in the text box and when they click “Submit to Class”, they will be able to see their classmates’ answers. The goal here is to have a variety of answers that the students submit for example; (4,6), (6,9) or even (0,0). The teacher can then have a discussion with the class about the variability in the answers.

Slide 1.4



Now that students have had a discussion on what a proportional line is and on what point B could possibly be, the original question is revisited. The graph is given to the students and they can correctly answer the question. They should be comfortable with the fact that there are multiple correct answers to this question.

Slide 1.5



This is what you should have had on the previous slide! Notice how the line isn't any different besides the fact that it is longer. It still goes through the origin and point A.

Here is the original question from slide 1.

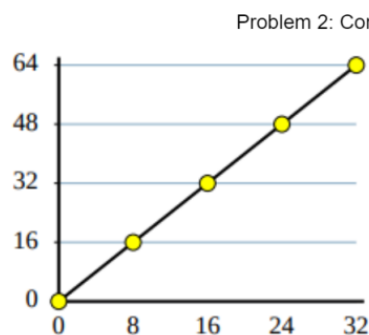
Line segment AB represents a proportional relationship. The graph shows Point A in red at (2,3). What is one ordered pair that could represent point B?

Answer the question in the text box below in a complete sentence!

Submit to Class

For Slide 1.6 students need to define the constant of proportionality in their own words. Since this is a review lesson, students should recognize the term. If needed, the teacher should review what the unit rate is and can mean in the context.

Slide 1.6



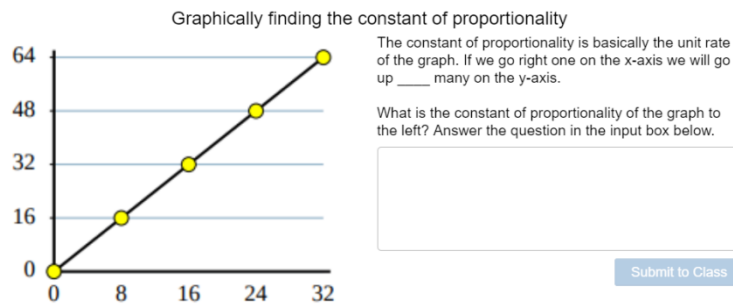
Sometimes when we have graphs with proportional relationships, we are asked to find the constant of proportionality.

In the input box below, please define constant of proportionality in your own terms.

Submit to Class

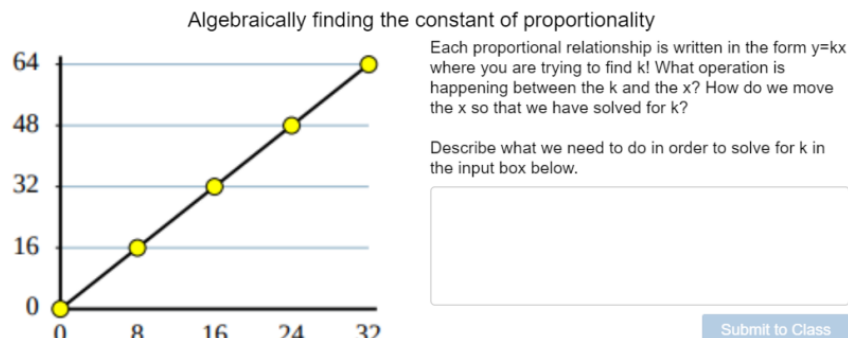
For Slide 1.7, students are required to find the constant of proportionality from the graph given to them. Now that they recall that the constant of proportionality is the unit rate of the graph, they should be able to find it on the given graph. The teacher should point out the scale of the graph is different on the x and y-axis.

Slide 1.7



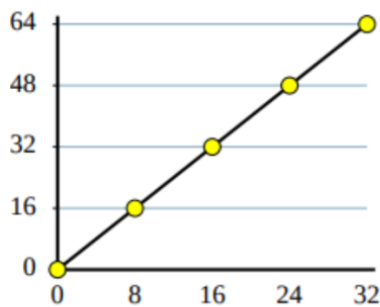
On Slide 1.8, students are asked to try to find the constant of proportionality based on the equation given to them. This slide would be a good slide to have the teacher turn on the “Teacher Control” button. When this button is pushed, all students will be brought to this screen and cannot leave it until the teacher releases the “Teacher Control” or if the teacher switches to another slide, in which case the student would automatically move to that slide. The teacher should show the students that solving for k is just solving a one-step equation and that if students should be able to divide the y -value by the x -value to get the constant of proportionality.

Slide 1.8



For Slide 1.9, students are putting the concept in Slide 8 into practice and finding the constant of proportionality for themselves. The students should know now that the constant of proportionality is 2. The teacher and students can discuss where else in the graph can you see a ratio of 2:1. The goal of this is for students to see that anywhere on the graph, students can take an x-value and multiply it by two to get a y-value or inversely take a y-value and divide by 2 to get an x-value.

Slide 1.9



Now that you have solved for k, pick any point on the line of your choosing.

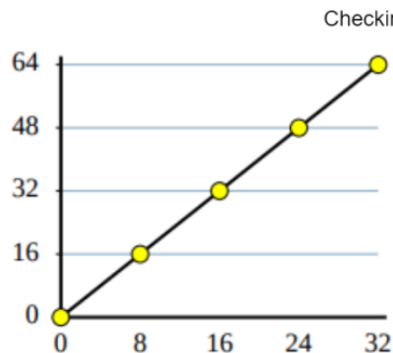
When you pick a point you now have an x and y value. "x" is the first number in the point and "y" is the second number in the point. So if I picked the point (1,5) I would know that $x=1$ and $y=5$.

Plug the number you got into your equation and solve for k! Write your answer in the input box below.

Submit to Class

In Slide 1.10, students are asked to check their answer for Slide 1.9 on the rest of their points. The teacher should make it a point to have the students consider what this means for all of the points on this graph including the points that are between the defined (yellow) points and the points on the line if it was extended past the graph.

Slide 1.10



Checking Your Answer

Does your answer make sense? Double check that your constant of proportionality works for all of the points on this line.

While allowing students to work at their own pace is invaluable, there are naturally going to be students who finish faster than some of their peers. Slide 11 is here for those students who may have a better understanding of the concepts reviewed in this lesson and therefore finished faster. Once students reach this slide, I first review each of their slides from the lesson and make sure that all of the work on the slides is correct. If there is a slide that has a mistake I can make sure I talk individually with that student and address the mistake that they made. Once all of the slides in the lesson are correct, the teacher can either give the student some extra problems to strengthen their understanding of a proportion or give them their homework.

Slide 1.11

Done!



Congratulations! You're done! Ask Mr. Rybak what you should do now! (It's going to be either I-Ready or your homework)

Lesson 2:

This lesson is designed to strengthen the vocabulary that students use while trying to describe proportional relationships on a graph. This lesson is called a desmos Polygraph lesson.

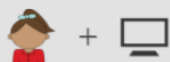
The following is a description of the Polygraph lesson from teacher.desmos.com.

We have designed Polygraph to foster the pleasure and the power of words without the drudgery of the lists.

With Polygraph, Desmos provides tools for developing informal language into formal vocabulary. Because words should result from a need to describe our world—this is where they gain their power.

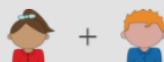
And we also know well the pleasure of having just the right word handy at just the right moment—what the French call *le mot juste*.

How Polygraph Works:



1. Practice

Each student plays a practice round against the computer to learn how the game works.



2. Play

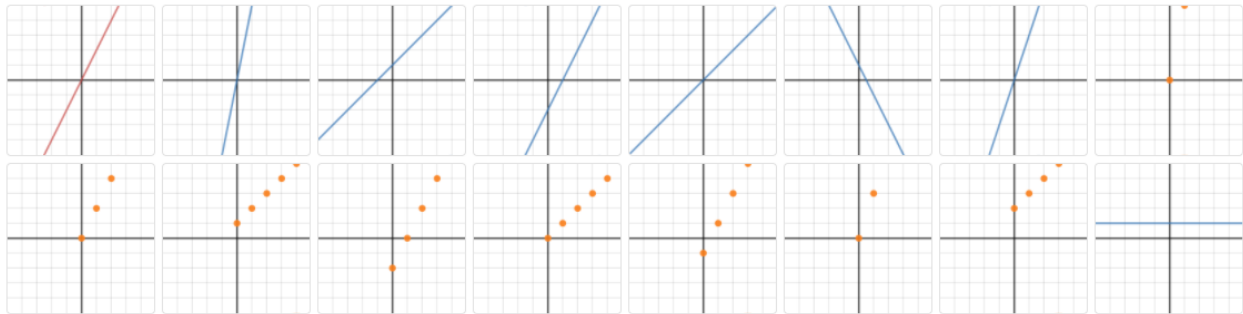
Next, students are paired with a classmate to play polygraph with mathematical cards. One person chooses a card; their partner asks yes/no questions in order to narrow a field of cards down to one.



3. Reflect

Between rounds, students answer questions that focus their attention on vocabulary and strategy.

Polygraph is very similar to the game Guess Who however instead of guessing the physical features of people, one of the students is given a graph while the other is trying to guess features of the graph. The graphs given to the students are shown below.



Here is an example of how a game might be played between two students.

Student 1: This student is told to choose one of the graphs from the list above.

Student 2: This student is told to guess a feature that could be on student 1's graph. Therefore, they might ask, "Does your graph have a solid line?"

Student 1: "No"

Student 2: Would then eliminate all of the graphs that have a solid line from the list of possible graphs. Then the student would ask another question. "Is (1,3) a point on your graph?"

Student 1: "No"

Student 2: Would eliminate any graph that had the point (1,3) defined on the graph.

The questioning would continue until student two eliminated all of the graphs on the list of possibilities besides one. If student two is correct both student 1 and student 2 get a point (this should avoid any student being dishonest with their answers). The game will keep track of how many wins and losses each student has. As the rounds go on, students will be paired with

different students in their class. The teacher should let the students play the game for about ten minutes so that they can get used to how the game works. Once this time is up the teacher should take back control of the classroom and talk about the vocabulary students were using in lesson 1. The teacher should point out that using these vocabulary terms would eliminate many more graphs for one question then asking about very specific points of the graph. For example, in the example game above if student 2 asked, “Is the graph proportional?” instead of asking “Is (1,3) a point on your graph?” they could have eliminated multiple graphs from the list of possible graphs rather than only one graph that had the point (1,3) defined on it.

The teacher should also point out that the students can ask about the unit rate of the graph. Students can ask questions such as “Is the unit rate greater than 2?” or “Is the unit rate 1?” Asking these questions not only helps the students win games faster, it gets them more comfortable with using vocabulary terms such as constant of proportionality, unit rate, and proportional. If needed, any review of those vocabulary terms can be done. When students can effectively use these terms in a conversation it deepens their conceptual understanding of the concept itself.

For a full explanation of the game by desmos, go to <https://teacher.desmos.com/polygraph-lines>

Lesson 3:

This lesson is designed to continue lesson 1 and 2’s content and apply the concept of unit rate and constant of proportionality to authentic problems.

This slide is a review of what unit rate means. The slide displays an authentic problem that the students will eventually solve. The teacher should stress the importance of being able to find the

unit rate because it can also help us predict unknown values that would be useful for the student to know.

Slide 3.1

Problems with contexts

Proportions have many applications to the real world and you're going to see many problems with real-world examples. Here's one:

Sam can prepare 20 wall paintings in four weeks. How much time will he need to prepare 80 wall paintings?

Don't jump to the answer just yet! We need to find how many weeks it takes for him to prepare 1 wall painting. What is the vocabulary term for finding how many/much we do something per 1 unit? Answer in the input box below.

Submit to Class

On Slide 3.2, the students are asked to recall the information they reviewed in lesson 1, finding unit rates. If the students are struggling with which order to divide the numbers in the teacher should point out what units should be on the unit rate. The unit should be paintings per week so the students should divide the 20 paintings but the 4 weeks. Students can check their answer from their peers' answers once they click "Submit to Class" and their answer is shown next to their peers' answers.

Slide 3.2

Unit Rates!

Nice job! We need to find the unit rate! How do we find the unit rate of Sam painting if he paints 20 paintings in four weeks? Put your answer in the input box below.

Submit to Class

In Slide 3.3, the students are asked to solve the original problem. Using their unit rate, they can create a table to find how many weeks it will take to paint 80 paintings. Students might need scrap paper to do their work on. Students will also be able to check their answers once they click “Submit to Class”.

Slide 3.3

Now that we know how many paintings he can paint in one week, we can use that information to find out how many weeks it will take him to paint 80 wall paintings.

Here is the original question:

Sam can prepare 20 wall paintings in four weeks. How much time will he need to prepare 80 wall paintings?

In the input box below, write your answer to this question in a complete sentence.

Submit to Class

In Slide 3.4, students are asked to solve a different problem using the same method as the previous three slides. This slide incorporates the “You Do” part of the I Do, We Do, You do method. With desmos, the first three slides were the “We Do” part that students can always go back to if they are struggling with the method. The teacher should make it clear that the students can always go back to previous slides for a reference.

Slide 3.4

Problem 2

Nice job! On a separate sheet of paper, try to solve this problem:

Sonya can walk 6 kilometers in 3 hours. If she has to walk 10 kilometers, how much time will it take her?

Write your answer in the text box below.

Submit to Class

In Slide 3.5 the problem changes slightly. Here, the students are asked to compare two unit rates. The hint is included so that students can figure out that they need to find more than one unit rate. The teacher may need to intervene based on how well each individual or class is doing. The teacher could take control of the entire class through desmos or they could address individual students if there are not too many who need assistance.

Slide 3.5

Problem 3 Stepping it up!!

Here's a harder problem!

AT&T charges \$76.00 for 5 GB of data or Sprint charges \$54.00 for 4.5 GB of data. Which is the better deal? Explain your answer.

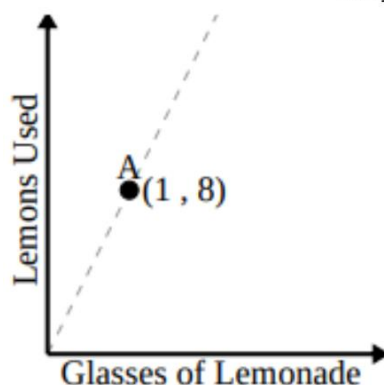
Do your work on a separate sheet of paper. Write and explain your answer in the text box below. (hint... ask yourself, how many unit rates do I need to find?)

Submit to Class

In Slide 3.6, students are asked to revisit the first two lessons on graphing proportional relationships and try to understand what the constant of proportionality can mean in the context of a given problem. This question is meant to bridge the gap between the procedural fluency that the students have been building with graphing proportional relationships and the conceptual understanding of proportional relationships that the students are being given in this lesson.

Slide 3.6

Analyzing a Graph



Kaylyn decides to open up a lemonade stand one weekend. The graph on the right shows the proportional relationship between how many glasses of lemonade she made and how many lemons she used.

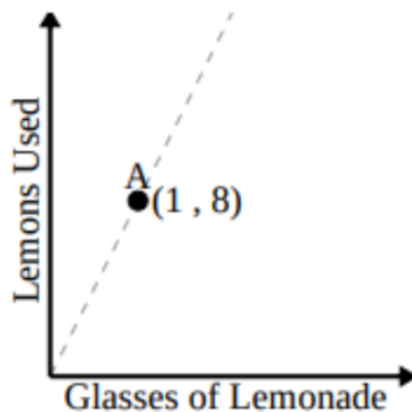
Identify the constant of proportionality between the amount of lemons Kaylyn used and how many glasses of lemonade she made.

Submit to Class

*If students struggle with the conceptual understanding of a proportional relationship or algebra, the teacher should take control and pace the lesson using desmos from Slide 6 through Slide 9.

This slide is a continuation of the previous slide and asks the students to create an equation from the graph they were given. The teacher may have to intervene with this slide based on how comfortable their class is with algebraic equations. The teacher might have to point out that the y-axis on the graph is lemons used and the x-axis is glasses of lemonade made. The students will be able to create the equation only by knowing that k is the constant of proportionality.

Slide 3.7



Write an equation relating lemons used to glasses of lemonade sold. Remember that a proportional relationship can be written in the form $y=kx$.

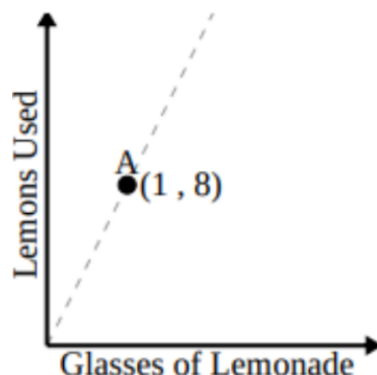
(Hint! Think about what y , k , and x MEAN....)

Write your answer in the text box below.

Submit to Class

In Slide 3.8, students are asked to use the equation they created in Slide 7 to predict how many lemons Kaylyn would need for five glasses of lemonade. Teacher intervention could also be beneficial based on how successful the class was with Slide 7.

Slide 3.8



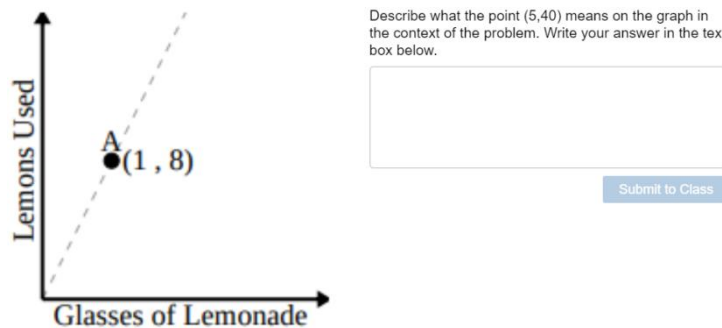
According to the proportional relationship, how many lemons would Kaylyn have used in order to make 5 glasses of lemonade? State and explain your answer in the text box below.

(Hint: Think about which variable is the glasses of lemonade! You know that variable is 5!)

Submit to Class

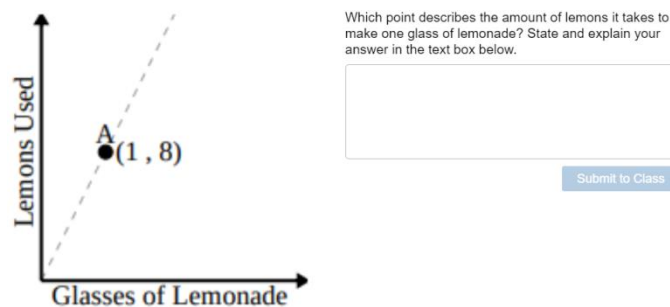
In Slide 3.9, students are asked to interpret what their answer should have been in Slide 8 within the context of the problem. This slide is designed to allow students to fully comprehend what each creating a proportional equation or graph can give them in an authentic problem.

Slide 3.9



This slide is designed for students to use their new conceptual understanding of what points mean on the graph of a proportional relationship to interpret what the constant of proportionality/unit rate of this graph means in the context of the problem. This should remind students of slide 6 where students first found the constant of proportionality and started thinking about this point in terms of the context of the problem.

Slide 3.10



Since this lesson heavily involves conceptual material, students will finish at different times.

Slide 3.11 is here for those students who may have a better understanding of the concepts reviewed in this lesson and therefore finished faster. Once students reach this slide, I first review each of their slides from the lesson and make sure that all of the work on the slides is correct. If there is a slide that has a mistake I can make sure I talk individually with that student and address the mistake that they made. Once all of the slides in the lesson are correct, the teacher can either give the student some extra problems to strengthen their understanding of a proportion or give them their homework.

Slide 3.11



Lesson 4:

Now that students have a stronger conceptual understanding of how proportional relationships are interpreted and work, students are going to be introduced to setting up proportions and solving them by cross-multiplying.

In Slide 4.1, students are given the objective of the lesson and are given an example of a proportional relationship. The teacher should mention that this method works with solving all proportions and will work given any proportional relationship the students see.

Slide 4.1

Proportions Day 4

$$\frac{3}{9} = \frac{x}{27}$$

There are many times this year where we will see a proportional relationship but won't be able to graph it to see what happens. When this is the case a good idea to help getting yourself started is to set up a proportion. An example of a proportion is given to you on the left.

Here, the students are given instructions to watch a video on YouTube. As you can see, the students can click on the link in the slide but can also copy and paste the text in the web browser. The video itself is a video created by Math Antics. This video teaches students how to solve proportions by scaling up or down and by cross-multiplying. I included a place for students who feel comfortable with scaling up and down to go to in the video. At 3:40, the video begins to discuss how to solve a proportion by cross-multiplying. The video in its entirety is 10 minutes and 29 seconds long. Some students might need the teacher to help them with the problem on the next slide based on what type of learner they are.

Slide 4.2

Video!

A great example of how to solve proportions is below. If you are okay with scaling up and down, you can skip to 3:40 to go to cross multiplying. I would highly recommend watching this part of the video because you are going to do work problems in this desmos.

The link to the VIDEO is right here:

<https://www.youtube.com/watch?v=USmit5zUGas>

Copy and paste that into your web browser to get the video.

In Slide 4.3, students are asked to solve the proportion they saw on the first slide. Students can always go back to the video for how to solve a proportion by either cross-multiplying or scaling up and down. The teacher should encourage students to go back in the video for assistance.

Students will be able to draw on the problem in desmos and check their answers with their peers once they click “Submit to Class.”

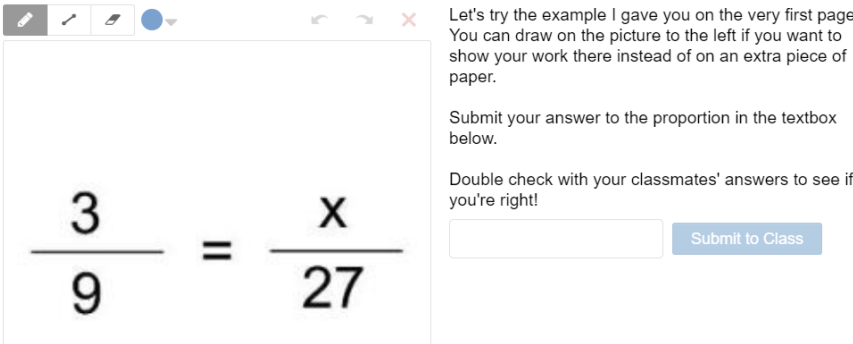
Slide 4.3

Practice

Let's try the example I gave you on the very first page. You can draw on the picture to the left if you want to show your work there instead of on an extra piece of paper.

Submit your answer to the proportion in the textbox below.

Double check with your classmates' answers to see if you're right!


$$\frac{3}{9} = \frac{x}{27}$$

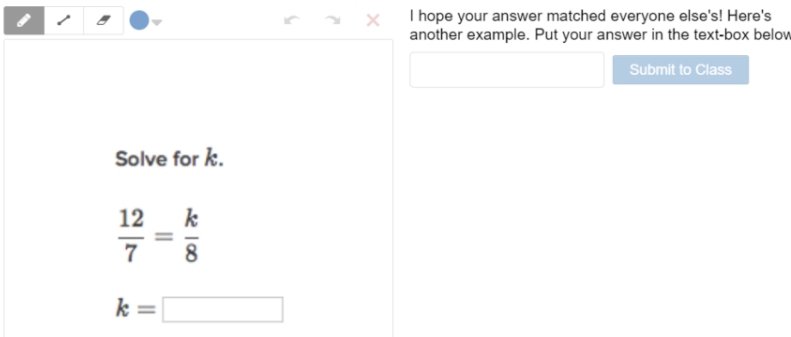
In Slide 4.4, students are given another example to practice solving proportions. However in this example, scaling up or down is difficult to do, so students are encouraged to cross-multiply.

Students will be able to draw on the problem in desmos and check their answers with their peers once they click “Submit to Class.”

Slide 4.4

Practice

I hope your answer matched everyone else's! Here's another example. Put your answer in the text-box below.



Solve for k .

$$\frac{12}{7} = \frac{k}{8}$$

$k =$

In this slide, students are given another proportion to solve. In this slide, the students may scale up/down or cross-multiply to solve this problem. Students will be able to draw on the problem in desmos and check their answers with their peers once they click “Submit to Class.”

Slide 4.5

Solve for g in the proportion.

$$\frac{45}{g} = \frac{5}{1}$$

$g =$

You're doing great so far! Here's another practice problem for you to do! We're moving on the word problems next. Please put your answer in the text-box below.

[Submit to Class](#)

In Slide 4.6, students are asked to solve a word problem that involves setting up a proportion. The video does review how to set up a proportion but the teacher may need to intervene based on their assessment with how well their class is doing with setting up and solving proportions. The students can draw on the word problem to underline the important information in the text. Students may also need a separate sheet of paper to show their work.

Slide 4.6

Mika can eat 21 hot dogs in 6 minutes. She wants to know how many minutes (m) it would take her to eat 35 hot dogs if she can keep up the same pace.

Here we have a word problem. Remember, the word problems LOOK harder but once we pick out the important information, they're just as easy as the problems you just completed!

The word problem to the left is the one you have to do! You can write on it so make sure you underline what is important and do your work on a separate sheet of paper!

Be sure to put your answer in the text-box below!

[Submit to Class](#)

This slide involves another word problem that students need to solve. They should solve this problem in a similar way that they solved the word problem in Slide 6. Students should attempt

this problem on their own and without teacher intervention if possible. The students can always go back to previous slides as a reference.

Slide 4.7

Word Problem (Last One!)

This is the last word problem you have to do for this desmos! Remember, the word problems LOOK harder but once we pick out the important information, they're just as easy as the problems you completed at the beginning!

Remember to show your work on a separate sheet of paper and you can underline important information on the question to the left. Write your answer in the text-box below!

Scott likes to run long distances. He can run 20 km in 85 minutes. He wants to know how many minutes (m) it will take him to run 52 km at the same pace.

Submit to Class

Just like the last slide in the other lessons, this slide is here for those students who may have a better understanding of the concepts reviewed in this lesson and therefore finished faster. Once students reach this slide, I first review each of their slides from the lesson and make sure that all of the work on the slides is correct. If there is a slide that has a mistake I can make sure I talk individually with that student and address the mistake that they made. Once all of the slides in the lesson are correct, the teacher can either give the student some extra problems to strengthen their understanding of a proportion or give them their homework.

Slide 4.8

Finish!

Nice job! Ask Mr. Rybak what to do now that you're done. A good guess would be to take out your weekly or get on I-Ready!



The Nearpod Curriculum: A Unit on Solving Algebraic Equations

Nearpod.com is a website that also allows teachers to create an interactive slideshow that students will work through at the teacher's pace. Teachers can ask students to answer multiple choice questions, fill-in-the-blank questions, open ended questions, and even draw on diagrams or graphs. Since Nearpod is mainly teacher paced, it allows the teachers to immediately receive data on how students are answering questions on a particular question. This allows teachers to show correct work, show incorrect work for analysis, or formatively assess the class's understanding of a particular slide with real time data. One of the risks of doing online lessons is that students can be distracted by other websites, however Nearpod will actually send the teacher a notification when the student exits nearpod while the lesson is in session. You can add a video from youtube.com or of your own if you wish to have students watch an educational video. There are also some lessons that have already been created by nearpod and are free to view and use on nearpod.com.

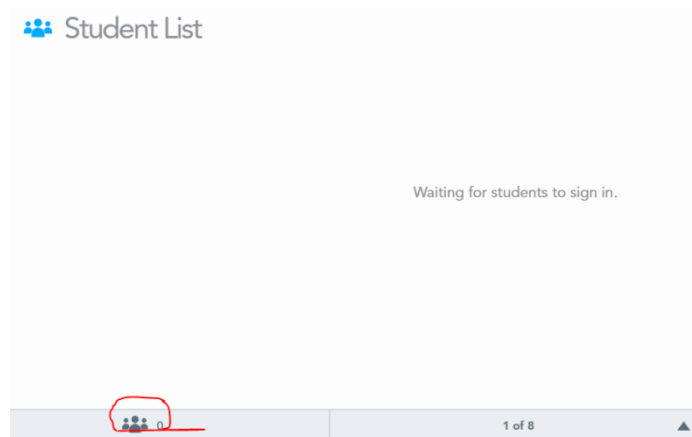
This unit has four lessons that were designed to be approximately 40 minutes long each for a class that meets daily. The unit will teach and review how to solve one and two-step equations. Each lesson was created by the author of this thesis using the free-version of nearpod so that any teacher could recreate or change any slide or animation in any of the lessons to teach certain content or meet the needs of any of their students. These lessons were designed to be student-paced, however these lessons could very easily be teacher paced. In the author's experience with using Nearpod and the pre-made lessons, most are teacher-paced. If the teacher is indeed leading a student-paced lesson, they should be monitoring the students' progress from

their teacher control panel on their screen and formatively assessing how well the class is doing as whole or how individual students are performing on each slide.

Lesson 1:

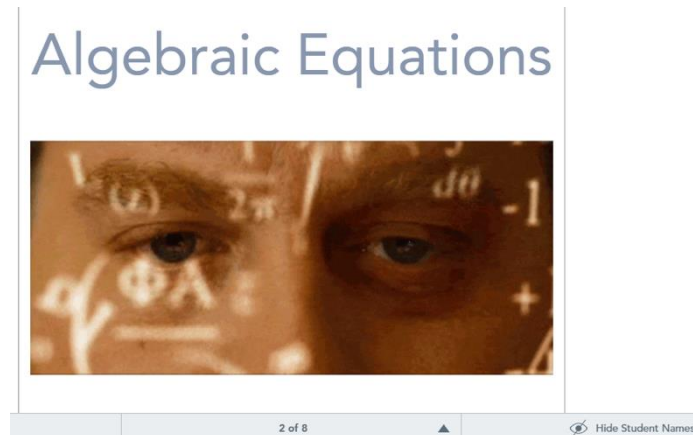
Slide 1.1 on the teacher console is for the teacher to see what students are in the class. The teacher will be given a class code for the students to join the nearpod before the lesson starts. The area circled in red is how many students are in the class. This will stay at the bottom of your screen the entire time and the teacher can always click on it to see what and how many students are in the lesson.

Slide 1.1




Slide 1.2 is the introduction slide to the nearpod. Here, the teacher should explain the objectives of the lesson. Nearpod has a small collection of gifs that you can put in your slide and the image shown here is actually a gif. If the teacher at any point during the lesson wants to hide the student names for any reason, they can click on the Hide Student Names icon on the bottom right of their screen.

Slide 1.2




Slide 1.3 is a multiple-choice poll. The question that the students see is “What does the word inverse mean?” and they are given their options A, B, or C shown in the image. As the students answer, nearpod automatically fills the gray circle with the color corresponding to the answer that the students submitted. A completely orange circle would mean that all students thought that the word inverse means “The opposite of something.” The teacher can click the red share button to share the results with their class for discussion.

Slide 1.3

 What does the word inverse mean?

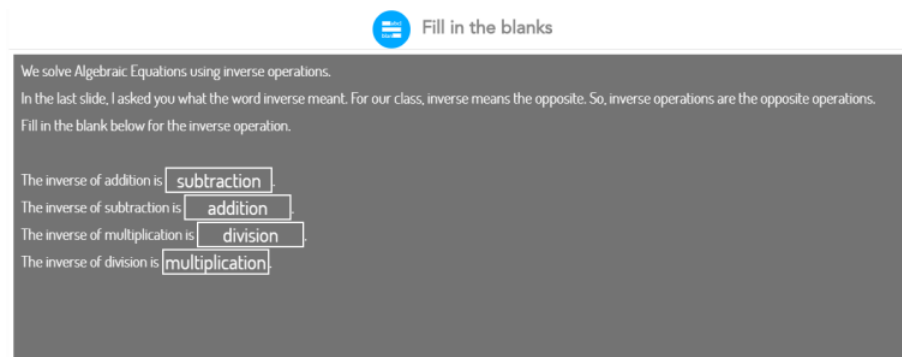
Student	A	B	C

 Share

- 0 C THE INNER MEANING OF ...
- 0 A A LINE IN A SONG
- 0 B THE OPPOSITE OF SOMET...
- 0 D NO ANSWER

Slide 1.4 is a fill in the blank question. Here, students are given an answer bank of “addition”, “subtraction”, “multiplication”, and “division” and students must click and the word to the appropriate blank as shown in the image to the right.

Slide 1.4



Fill in the blanks

We solve Algebraic Equations using inverse operations.
In the last slide, I asked you what the word inverse meant. For our class, inverse means the opposite. So, inverse operations are the opposite operations.
Fill in the blank below for the inverse operation.

The inverse of addition is subtraction
The inverse of subtraction is addition
The inverse of multiplication is division
The inverse of division is multiplication

Slide 1.5 is a place where students can stop, take a breather and return to any of the previous slides if they need to. It also prepares them for the video in the next slide. On the bottom are places in the video that students can go to if they already understand certain concepts about solving algebraic equations. This slide also allows the teacher to differentiate instruction by assigning certain points of the video to certain students. For example, Student A has shown that they have a strong understanding of algebraic equations so they might skip straight to 8:20 in the video, while Students B and C who are struggling a little bit more might watch the whole video.

Slide 1.5



Break!

So now you know what inverse operations are and you understand what each operations' inverse is. On the next slide is a video for you to watch on how to solve 1-step algebraic equations. It's about 10 minutes long but it tells you how to solve a few different algebraic equations. It even gives you some tricky examples! If you already know what the video is telling you, feel free to skip ahead in the video to a part that you don't understand!

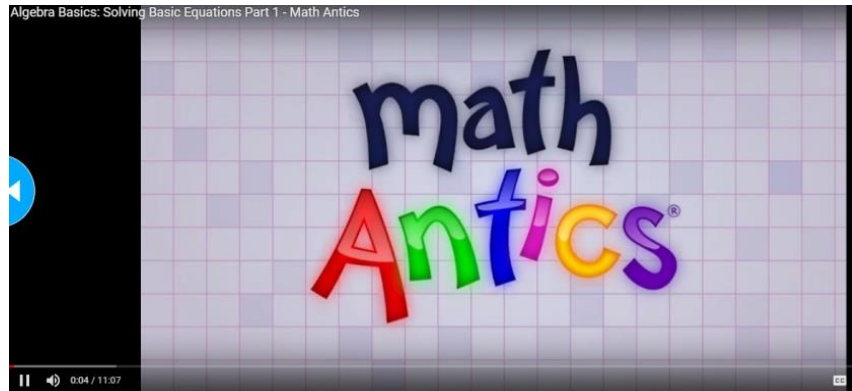
Here are some places that you could skip to:

- Keeping Equations Balanced - 1:15
- Addition Problems - 3:31
- Subtraction Problems - 6:50
- Tricky Subtraction Problems - 8:20

On Slide 1.6, there is a video attached from youtube.com. The video is “Algebra Basics: Solving Basic Equations Part 1 – Math Antics.” Students can watch this video at their own pace and take

notes throughout the video, pausing as needed. Nearpod allows you to upload a video from youtube.com or a video of your own that is saved locally on a computer.

Slide 1.6



On Slide 1.7, the students are asked to solve two, one-step algebraic equations. Nearpod allows a teacher to upload their own image such as this and when the students see it, they are able to draw and show their work on screen. As the students complete their work, their submissions will appear on the teacher console. The teacher can then use a student's work and present it to the class for discussion purposes.

Slide 1.7

Solve the following algebraic equations. Make sure to show all work!

$$x - 7 = 23 \qquad x + 3 = 14$$

Draw it background image

Slide 1.8 is a quiz for the students to complete after they have finished the lesson. This allows the teacher to formatively or formally assess the students' understanding of the lesson. As the students answer each question, their names and scores will appear on the teacher console shown to the left. This slide can be used as a "Ticket Out The Door" that is immediately graded. The

teacher can address any concerns they have with the students' understanding before they leave.

This could be classroom wide feedback or individual feedback.

Slide 1.8

✓ Show me what you got! Make sure you show your work on a separate sheet of paper!

Teacher console interface showing a 'Share' button and a table with columns for Student, Score, and three empty rows.

Student	Score	1	2	3

Legend:

- 0 CORRECT
- 0 INCORRECT
- 0 NO ANSWER

The remaining images in this lesson are the questions asked in the quiz. The questions appear just as the students would see them, however the answer to each question is highlighted in green on the teacher console as shown in each image.

1 Solve the equation: $x-2=5$

A 1
B 3
C 5
D 7

2 Solve the equation: $x+4=5$

A 1
B 3
C 5
D 7

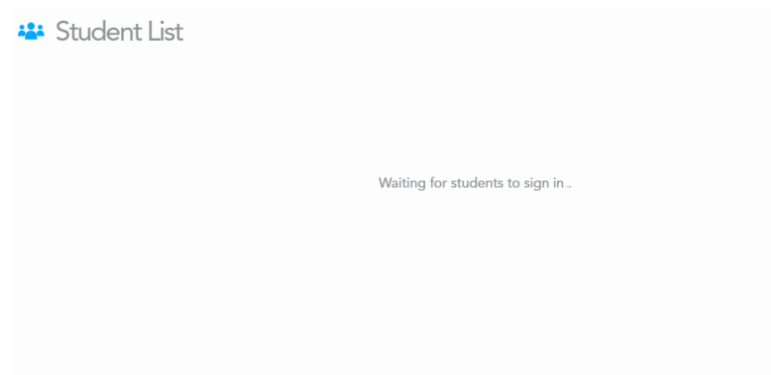
3 Solve the equation: $10-x=6$

A 4
B -4
C 0
D 6

Lesson 2:

Slide 2.1 on the teacher console is for the teacher to see what students are in the class. The teacher will be given a class code for the students to join the nearpod before the lesson starts.

The area circled in red is how many students are in the class. This will stay at the bottom of your screen the entire time and the teacher can always click on it to see what and how many students are in the lesson.

Slide 2.1

Slide 2.2 is an introduction slide to the lesson. Here, the teacher can quickly discuss and review what the students learned in the last lesson and explain the objectives for the current lesson.

Slide 2.2

One-Step Algebraic Equations using Multiplication and Division



Slide 2.3 is a review of the material from the Lesson 1. From the submissions that the teacher receives, they can formally assess whether or not they need to revisit the content from Lesson 1 before they move on to the current lesson.

Slide 2.3


Solve the following problem and show your work. This is what we learned last class!


$$26 = 8 + v$$

Draw it background image

Slide 2.4 is a review of content that was covered last class but is important for the current lesson. As students answer, their answers will appear in the data table shown to the right. The gray circle will also fill with the color corresponding to the answer that a student picked. For example, if most of the circle were orange, then the teacher would know that most of the class thought that the opposite of multiplication was subtraction. The teacher could then address this concern.

Slide 2.4

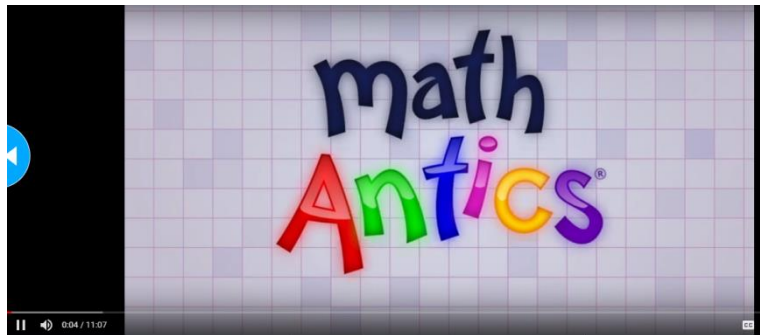
 Review!! What is the opposite operation of multiplication?

Student	A	B	C	D
				

- ☐ (D) MULTIPLICATION
- ☐ (C) DIVISION
- ☐ (A) ADDITION
- ☐ (B) SUBTRACTION
- ☐ (E) NO ANSWER

On Slide 2.5, there is a video attached from youtube.com. The video is “Algebra Basics: Solving Basic Equations Part 2 – Math Antics.” Students can watch this video at their own pace and take notes throughout the video, pausing as needed. Nearpod allows you to upload a video from youtube.com or a video of your own that is saved locally on a computer.

Slide 2.5



Slide 2.6 asks students to show their own work solving one-step equations using division and multiplication. Students can show their work on the slide and submit. Nearpod allows you to add a video to the question. The video from Slide 5 is added Justin case students want to go back to the video to watch. In other lessons, a teacher might use this feature to have a video explaining a topic and the question could be asked in the video. This video can be uploaded from a computer or taken from youtube.com. Included in this image is what a teacher would see on their console when a student has not submitted their work.

Slide 2.6



Solve the equations below! Try to write what operation you're going to do to both sides above equation to help you out!

$3x = 36$	$\frac{y}{8} = 3$
Draw it background image	Awaiting drawing
	Matt

Slide 2.7 is the quiz that students will take at the end of the lesson. These questions do not have to be summative. The teacher can use these questions for student practice or for formative assessment. Shown to in the image is the student “Matt” who has not answered any questions. As

this student answers questions, their answers will appear next to their name on the teacher console. The gray circle will also start to fill with green and red as the student answers questions correctly and incorrectly respectively.

Slide 2.7



Solving equations with Multiplication and Division.



0 CORRECT
0 INCORRECT
100 NO ANSWER

Student	Score	1	2	3	4
Matt	0/4	-	-	-	-

The remaining images in this lesson are the questions asked in the quiz. The questions appear just as the students would see them, however the answer to each question is highlighted in green on the teacher console as shown in each image.

Solving equations with Multiplication and Division... Close

1 Solve the equation on a separate sheet of paper.
 $5x=15$

A $x=1$
B $x=2$
C $x=3$
D $x=4$

Solving equations with Multiplication and Division... Close

2 Solve the equation on a separate sheet of paper.
 $a/4=5$

A $a=10$
B $a=20$
C $a=30$
D $a=40$

Solving equations with Multiplication and Division... Close

3 Solve the equation on a separate sheet of paper.
 $x+4=9$

A $x=2$
B $x=3$
C $x=4$
D $x=5$

Solving equations with Multiplication and Division... Close

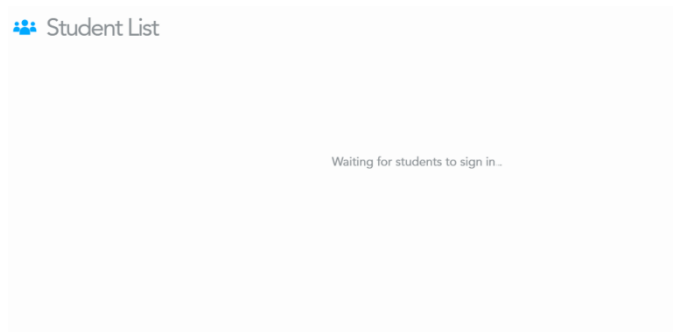
4 Solve the equation on a separate sheet of paper. $n-10=5$

A $n=5$
B $n=10$
C $n=15$
D $n=20$

Lesson 3:

Slide 3.1 on the teacher console is for the teacher to see what students are in the class. The teacher will be given a class code for the students to join the nearpod before the lesson starts. The area circled in red is how many students are in the class. This will stay at the bottom of your screen the entire time and the teacher can always click on it to see what and how many students are in the lesson.

Slide 3.1



Slide 3.2 is an introduction slide for the students. Here the teacher should explain the objectives of the lesson to the class. The teacher could also take this opportunity to quickly review the content from the last two lessons.

Slide 3.2

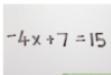
Two Step Equations

Now that you know how to solve one-step algebraic equations we're going to step it up a notch to two-step equations.

In Slide 3.3, students are asked to respond to this extended response question. The image can be enlarged from students clicking on it. From the teacher console, the teacher can see all of the

students' responses as shown in the image to the right. The teacher can then use either one, or a number of student responses to facilitate a discussion among the class on how they would solve a problem similar to the one given to them.

Slide 3.3

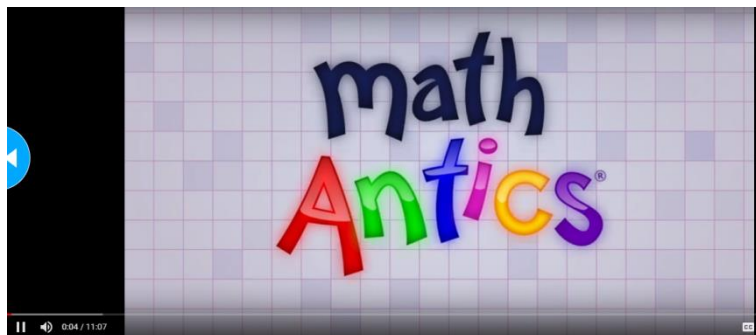


Consider what we know about solving an algebraic equation. Explain IN DETAIL how you think you could solve the equation to the left. Click on the image to enlarge it. Feel free to try to solve it and write your answer after your explanation.

Student	Answer	PARTICIPATION 0%
No results, yet.		

On Slide 3.4, there is a video attached from youtube.com. The video is “Algebra Basics: Solving 2-Step Equations – Math Antics.” Students can watch this video at their own pace and take notes throughout the video, pausing as needed. Nearpod allows you to upload a video from youtube.com or a video of your own that is saved locally on a computer.

Slide 3.4



Slide 3.5 asks students to answer a question on their own by solving a two-step equation. The students cannot draw on this question, so the teacher should encourage them to show their work on a separate sheet of paper. As the students respond, their name will appear with their answer on the teacher console. The gray circle will also fill with the colors corresponding to the answers

the students are submitting. For example, the graph could be partially green, partially yellow, partially blue, but mostly gray. This could tell the teacher that the students are either arriving at an answer that does not fit with any of the choices, or that the students are getting stuck before they can arrive at an answer. If this were the case, the teacher could review this problem and this slide could be done as a class.

Slide 3.5

What is the solution to the equation $9=3x-6$

Student	A	B	C	D

Share

- D 1
- C 5
- A 9
- B 3
- E NO ANSWER

Slide 3.6 asks the students to solve two questions involving solving two-step algebraic equations. In this slide, students can draw on the slide and submit their work to the teacher. The teacher can then use these submissions for formative assessment or to share with the class to start a discussion.

Slide 3.6

Solve both equations. Remember, we solve equations using the Reverse Order of Operations!

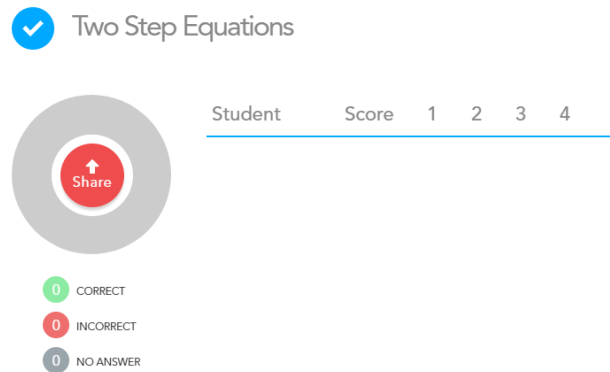
$$6 = \frac{x}{4} + 2$$

$$-6 + \frac{x}{4} = -5$$

Draw it background image

Slide 3.7 is the quiz that students will take at the end of the lesson. These questions do not have to be summative. The teacher can use these questions for student practice or for formative assessment. As student answer questions, their answers will appear next to their name on the teacher console. The gray circle will also start to fill with green and red as the students answer questions correctly and incorrectly respectively.

Slide 3.7



The remaining images in this lesson are the questions asked in the quiz. The questions appear just as the students would see them, however the answer to each question is highlighted in green on the teacher console as shown in each image.

Two Step Equations Close

1 What is the solution to the following equation? $2x+5=17$

A 11
B 3.5
C 13.5
D 6

Two Step Equations Close

2 What is the solution to the following equation? $6x-3=15$

A 2
B 3
C 5.5
D -1.5

Two Step Equations Close

3 What is the solution to the following equation? $x/3+1=7$

A 18
B 24
C 2
D 6

Two Step Equations Close

4 What is the solution to the following equation? $x/5-2=1$

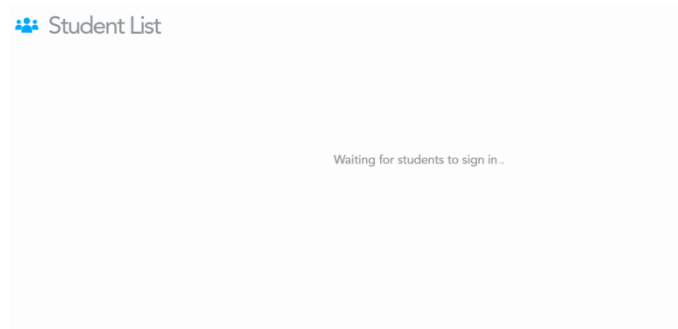
A -5
B 15
C 7
D 3

Lesson 4:

Slide 4.1 on the teacher console is for the teacher to see what students are in the class. The teacher will be given a class code for the students to join the nearpod before the lesson starts.

The area circled in red is how many students are in the class. This will stay at the bottom of your screen the entire time and the teacher can always click on it to see what and how many students are in the lesson.

Slide 4.1



Slide 4.2 is an introduction to this lesson. Here, the teacher can explain the objectives of the lesson. The teacher could give a quiz the next class if they feel that their class is strong enough to solve two-step equations after this lesson. In the image to the right, it may seem like a picture but this is another gif that nearpod allows one to insert into their slides.

Slide 4.2

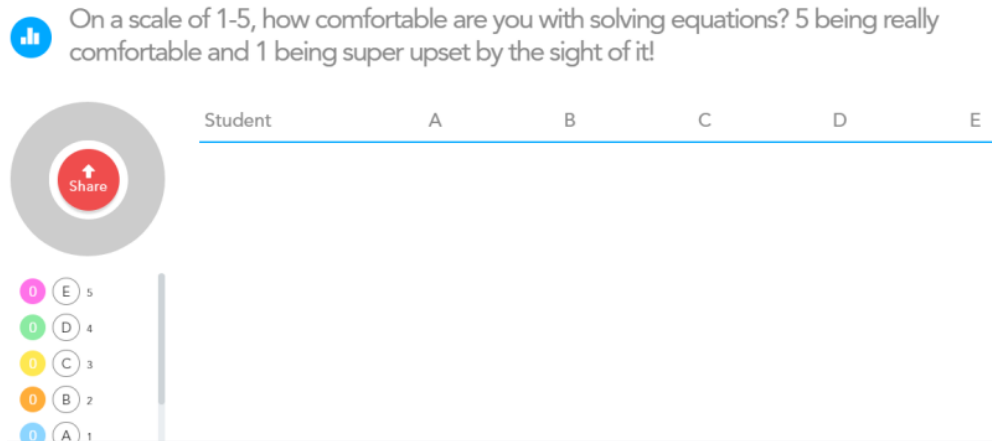
Review Day!



Slide 4.3 is designed to be a formative assessment for the teacher to use in class. If the class responds with lower numbers, the teacher knows that generally, the class feel weak and uncomfortable with solving equations. If the class responds with numbers close to 5, then the teacher can feel comfortable about giving students this lesson to do at their own pace.

Slide 4.3

On a scale of 1-5, how comfortable are you with solving equations? 5 being really comfortable and 1 being super upset by the sight of it!



Student	A	B	C	D	E
1					
2					
3					
4					
5					

Slide 4.4 is meant to be a “Ticket In The Door” where students are expected to solve and show their work for the problems given to them. This give students the opportunity to ask questions to their peers or teacher on how to solve these types of equations if they have any.

Slide 4.4

Just to get warmed up, try to solve the following equations!

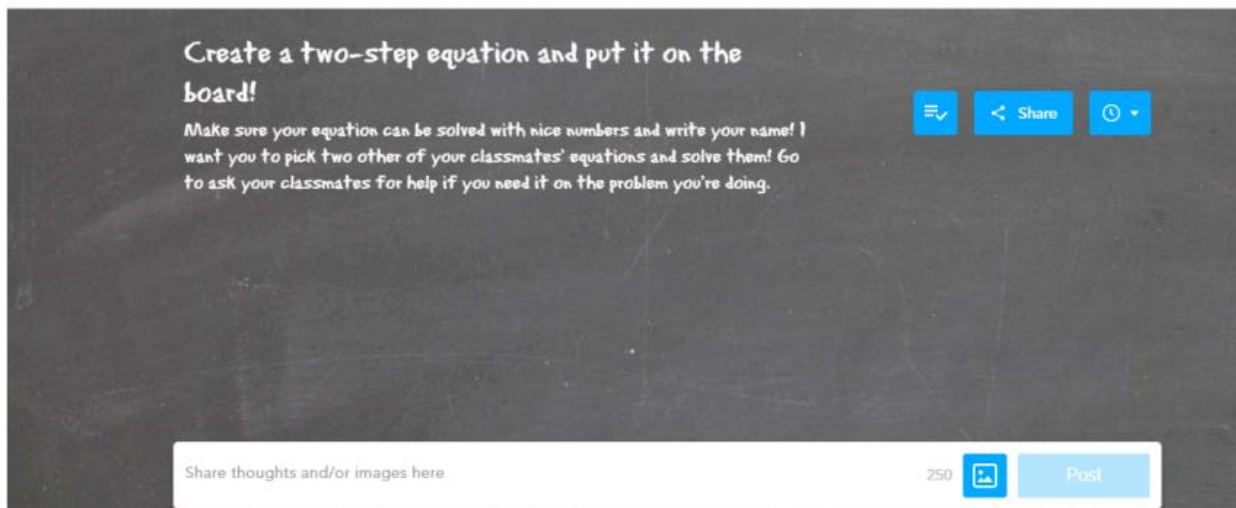
$9 + 9n = 5$

$2(3 + 6) = 84$

Draw it background image

Slide 4.5 is a collaboration board. Here, students will submit their name and a two-step equation that they have created and solved. Then they will pick a different student's problem and try to solve it. Once they have solve their peer's problem they can ask that student whether or not their answer is correct. If any student is struggling with solving their peer's problem, then they can ask the creator for a hint or help on the problem. This will help create discussions among classmates and develop higher level thinking.

Slide 4.5



Slide 4.6 is designed for students to complete individually. If students completed the last slide by themselves then this slide will just be one more problem to solve. However if Slide 4 was completed as a class or with the teacher's support, then this will be the first problem that students completed on their own.

Slide 4.6

Solve the following algebraic equations. Make sure to show all work!

$$6 = \frac{a}{4} + 2$$

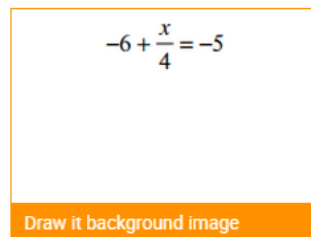
Draw it background image

Slide 4.7 is another slide where students need to show their work and submit it to the teacher.

This problem is different than Slide 4.6 because this problem requires the students to use integers. With the individual submissions in Slide 4.6 and 4.7 the teacher can determine where individual students are struggling.

Slide 4.7

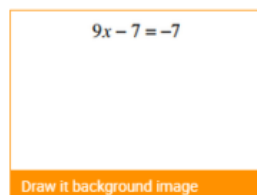
Solve the following algebraic equations. Make sure to show all work!

$$-6 + \frac{x}{4} = -5$$


Slide 4.8 is designed to be a relatively simple two-step equation to solve but the trick here is that the answer is 0. This problem will show the students that an answer of 0 is perfectly acceptable and they don't need to second guess themselves if they get 0 as a solution.

Slide 4.8

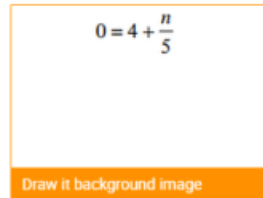
Solve both equations. Remember, we solve equations using the Reverse Order of Operations!

$$9x - 7 = -7$$


Slide 4.9 is another problem to help students become accustomed to working with 0. Students are expected to show their work and draw on the problem.

Slide 4.9

Solve both equations. Remember, we solve equations using the Reverse Order of Operations!


$$0 = 4 + \frac{n}{5}$$

Slide 4.10 is designed to have students analyze themselves to determine if they are comfortable with the material they are working on. If they feel that they need some more practice, the teacher would have a worksheet of practice problems that they could work through. If they feel comfortable then they can move along to the quiz on the next slide.

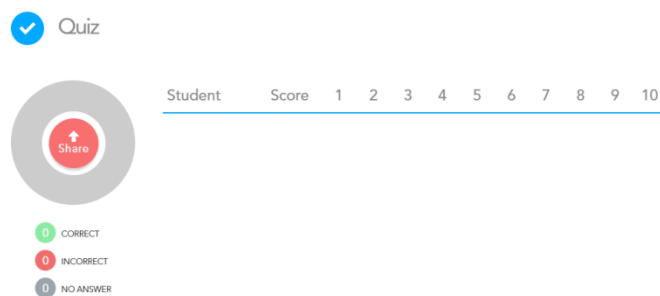
Slide 4.10

Think!

I want you to think about how comfortable you were with solving the equations in the previous slides. Did you feel awesome and move right through them? Or do you think you could use some more practice? If you think you need some more practice, ask your teacher for the review worksheet they have for you. If you feel really comfortable with these equations then go on to the quiz and see how you do!

Slide 4.11 is the quiz at the end of the lesson. The teacher can use this quiz as a summative or formative assessment for the end of the unit. There are 10 questions to this quiz and some students might not be able to finish the quiz if they took more time completing the earlier slides.

Slide 4.11



The remaining images in this lesson are the questions asked in the quiz. The questions appear just as the students would see them, however in each question there will be an image in the top left that students can click on to enlarge the equation that they will be solving. All of the answers are circled in red.

$$-4 = \frac{r}{20} - 5$$

Solve the equation in the image to the left.

☒ 20

☐ 60

☐ -60

☐ 120

$$-1 = \frac{5+x}{6}$$

Solve the equation in the image to the left.

☒ -11

☐ -35

☐ -12

☐ -1

$$-6 = \frac{n}{2} - 10$$

Solve the equation to the left.

☐ -32

☐ -2

☐ -22

☒ 8

$$\frac{v+9}{3} = 8$$

Solve the equation in the image to the left.

☐ -3

☒ 15

☐ 51

☐ 3

$$-9x + 1 = -80$$

Solve the equation to the left.

☐ -9

☒ 9

☐ 8

☐ -8

$$2(n+5) = -2$$

Solve the equation to the left.

☐ -14

☐ 6

☒ -6

☐ -4

$$-2 = 2 + \frac{v}{4}$$

Solve the equation to the left.



- ☒ -16
- ☐ 16
- ☐ 0
- ☐ -10

$$144 = -12(x + 5)$$

Solve the equation to the left.



- ☐ -119/12
- ☐ 119/12
- ☒ -17
- ☐ -7

$$10 - 6v = -104$$

Solve the equation to the left.



- ☒ 19
- ☐ -26
- ☐ 26
- ☐ 94/6

$$-15 = -4m + 5$$

Solve the equation to the left.



- ☐ 10/4
- ☐ -10/4
- ☒ 5
- ☐ -5

Validity

The author of this thesis assessed the validity of this curriculum project after implementing it in a 7th grade mathematics classroom. After implementing and reviewing the curriculum, the author made some edits to the original curriculum. While in most lessons, the material is designed to be student-paced and encourage higher level thinking, the author observed that in the Nearpod lessons, students would rush through the lessons by submitting incorrect answers in an attempt to finish the lesson as quickly as possible. A similar behavior was observed when the students were given a video in the Nearpod unit. Some students would not watch the video and skip ahead to the questions. As a result, the author made the lessons in the Nearpod unit teacher-paced but kept the material in the unit the same. In the Desmos unit, the

author found success in keeping the lessons student-paced. By using the “Teacher Control Panel” that Desmos provides, the author was immediately able to notice and refocus any student who was attempting to rush through a lesson. However in the lessons where a video was provided for the students to watch, such as in lessons 4, Slide 2, the author found that turning on the “teacher paced” mode during those particular slides ensured that all students watched the entirety of each video.

Overall, the author felt that the lessons in both curriculums aligned well to the Common Core State Standards. The students were engaged in each lesson and the context provided in the curriculum were appropriate and authentic.

Conclusion

The primary goal of this curriculum was to target teachers who would rate themselves as a 0, 1, or 2 on Moersch’s five level scale (Moersch,1998).. The author of this thesis created a curriculum that is easily adaptable to any curriculum and easily modified to meet the needs of any students or the objectives of any teacher. After reviewing this curriculum, any reader should be able to create or use a lesson from either website used in this curriculum. The author hopes that these targeted teachers can learn how to use these technologies and understand the benefit of implementing them into their classroom with as little as one lesson or as big as an entire unit. While this curriculum was centered on content from 7th and 8th grade, the author hopes that educators teaching any grade level can modify these technologies to teach any curriculum or grade level they need.

The author also would like to remind any educator that is interested in starting to implement technologies such as the ones used in this thesis that both teacher.desmos.com and

nearpod.com have pre-made lessons that anyone can have access to and use. On nearpod.com, the number of free lessons to use is very limited but most pre-made lessons cost less than \$3. The lessons on nearpod.com also cover a variety of subjects not just mathematics. However, on teacher.desmos.com every lesson is a mathematics lessons and free to use. The pre-made lessons on teacher.desmos.com are created by the developers of Desmos and often have applications and activities that normal users would not be able to create.

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